S.E. (Computer Engineering) (First Semester)

EXAMINATION, 2016

DATA STRUCTURES AND ALGORITHMS

(2015 PATTERN)

Time : Two Hours                     Maximum Marks : 50

N.B. :—  (i) Attempt Q. 1 or Q. 2, Q. 3 or Q. 4, Q. 5 or Q. 6 and
         Q. 7 or Q. 8.

         (ii) Neat diagrams must be drawn wherever necessary.

         (iii) Assume suitable data, if necessary.

1.  (a) Define algorithm and its characteristics. [4]

    (b) Write pseudo c/c++ code to perform simple transpose of sparse
        matrix. Discuss its time complexity. [6]

    (c) Derive address calculation formula for one-dimensional array
        with one example. [2]

Or

2.  (a) Explain asymptotic notations-Big-O, Theta and omega with
        one example of each. [6]

    (b) Write pseudo c/c++ code to perform polynomial multiplication
        using arrays. [6]
3. (a) Write pseudo c/c++ code to represent doubly linked list as an ADT.  
(b) Explain step-by-step conversion using stack for given infix expression to postfix expression:

\[((a / (b - c + d)) * (e - a)) * c\]

Or

4. (a) Write pseudo c/c++ code to implement stack as an ADT.  
(b) Write an algorithm to perform the following operations on singly linked list:

1. Reverse
2. Sort.

5. (a) Write pseudo c/c++ code to represent deque and perform the following operations:

1. Create Deque
2. Insert
3. Delete
4. Display.

(b) What is circular queue? Explain the advantages of circular queue over linear queue.

Or

6. (a) Write pseudo c/c++ code to implement circular queue using arrays.

(b) Explain applications of priority queue in detail.
7. (a) Explain quick sort and sort the given list using quick sort:

15, 08, 20, -4, 16, 02, 01, 12, 21, -2

(b) Write an algorithm for Fibonacci search and find out time complexity.

Or

8. (a) Explain shell sort and sort the given list using shell sort:

08, 03, 02, 11, 05, 14, 00, 02, 09, 04, 20

(b) Write short note on stability of sorting. Compare Heap sort and Quick sort with one example and discuss time complexity.